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ABSTRACT

This document is designed to provide students with an opportunity to share feelings and clarify their own values given the facts about nuclear technology. Using this short curriculum, students should be able to: (1) explore their associations with nuclear issues; (2) analyze guidelines for conflict resolution in personal situations; (3) analyze differences and similarities in the process of resolving conflict at the personal level and resolving conflict through negotiations at the international level; (4) assess the health risks inherent in using nuclear energy; (5) weigh the danger of accidents and false alarms in the use of nuclear energy against the need for preparedness; (6) become familiar with the immediate and long-term effects of nuclear war; (7) empathize with the survivors of Hirsoshima; and (8) envision their ideal world and consider possible actions they could take to work for that world. Eighteen worksheets on nuclear issues are provided. (JD)

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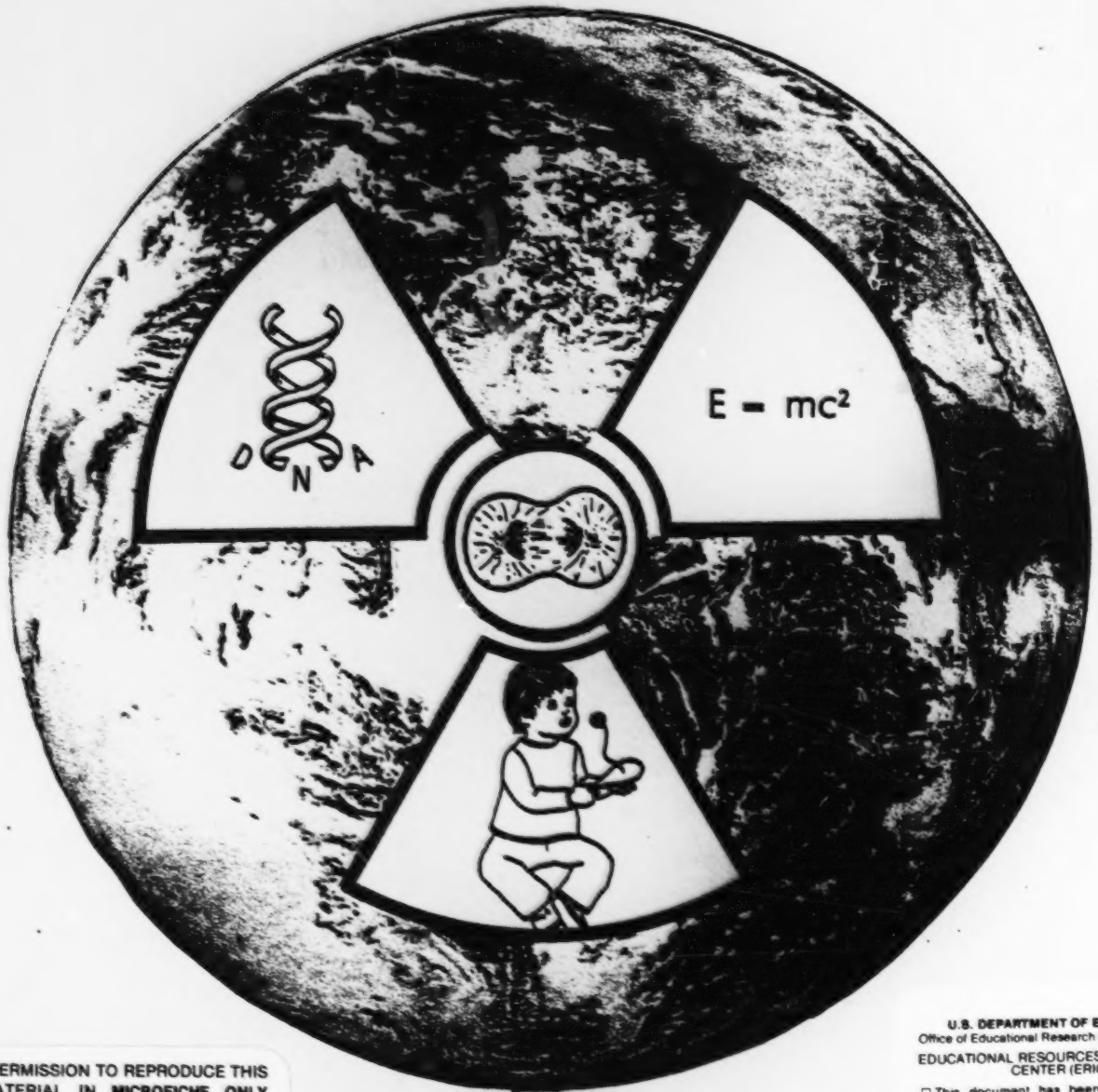
Nuclear Issues

Strategies and Worksheets

Health Education



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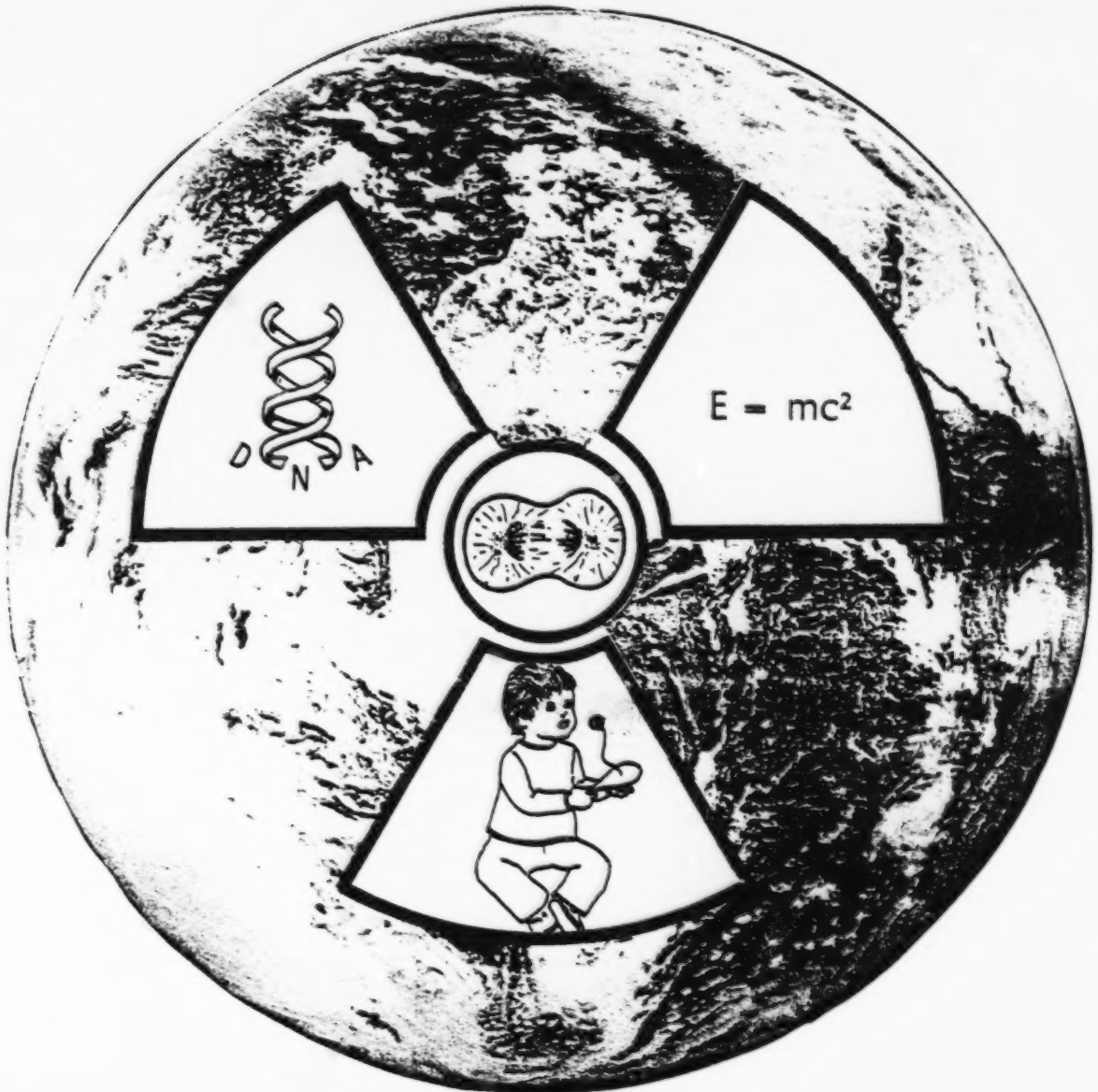

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The guide was prepared for publication by the staff of the Curriculum Production Unit, Alaire Mitchell Unit Head, and coordinated by Steven Goodman. Maureen Maguire designed the cover.

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Section 1

Nuclear Issues — Strategies

"We do not inherit the world from our parents...
We borrow it from our children."

--Ancient Persian saying--

RATIONALE

Until recently the subject of nuclear technology has been too much for us as a society to handle emotionally. Dr. Robert Jay Lifton talks about it as the "double life" we lead. On the one hand we know very well that in a moment everything around us, everyone we love, could be destroyed by a nuclear weapon. And yet we go about on a daily basis with business as usual. Now people are beginning to cope with the prospect of nuclear war, but it is not easy.

Health education talks about health as more than the absence of disease. Health is a state of well-being. Such well-being in the nuclear age includes the growth of persons in dignity, in control of their own destinies, and in solidarity and service with other human beings. In order to have the values and skills necessary to build a safe nuclear technology, facts must be learned and feelings must be shared in the process. This curriculum is especially geared to provide an opportunity for students to share feelings and clarify their own values given the facts about nuclear technology. We can feel tremendous relief when we communicate to others some of the painful feelings surrounding this issue. It is our hope that as students are provided with an opportunity to share feelings, they will also explore implications and meanings to affirm positive choices for action.

PERFORMANCE OBJECTIVES

The students will be able to:

- Explore their associations with nuclear issues.
- Analyze guidelines for conflict resolution in personal situations.
- Analyze differences and similarities in the process of resolving conflict at the personal level and resolving conflict through negotiations at the international level.
- Assess the health risks inherent in using nuclear energy.
- Weigh the danger of accidents and false alarms in the use of nuclear energy against the need for preparedness.
- Become familiar with the immediate and long-term effects of nuclear war.
- Empathize with the survivors of Hirsoshima.
- Envision their ideal world and consider possible actions they could take to work for that world.

STRATEGY 1

The following exercises will help assess what students are already thinking and feeling about nuclear issues and the effects of these issues on their future.

. Ask students to respond briefly to the words "nuclear issues" with anything that comes to mind. Write responses on the chalkboard, then organize the responses into categories for further discussion or distribute Worksheet 1, "Student Questionnaire." For the questionnaire have students discuss their answers in small groups of three or four. Emphasize that this is a chance to listen to each other without judgment, asking listeners to give each speaker their full attention. Have students also fill out the form and have a committee tabulate the results of selected questions including number eight.

. Share the tabulated results with class and compare student feeling on the threat of nuclear war with a 1981 Gallup poll which found that 68% of the people believed that nuclear war might happen within ten years and that only 9% thought they had a good chance of surviving.

. Distribute Worksheet 2, "The Double Life (Psychological Effects)." Read the worksheet together as a class.

. Have students explain their answers to the following questions:

- How did the feelings of the class compare with those cited in the poll?

- What is a psychological defense mechanism?

- What psychological defense mechanisms does the article say people employ to protect themselves from their negative feelings about the danger of nuclear war?

- What other issues (other than nuclear issues) might trigger similar defense mechanisms? In our society? In one's personal life?

- According to the quote from Joanna Macy, what are the negative effects of these psychological mechanisms? Do you agree or disagree? Explain.

- Do you agree or disagree with the quotation from Robert Jay Lifton? Explain

- Do you feel that your own feelings have been numbed? In what way?

- What could you do to counteract this?

- Why is Worksheet 2 titled "The Double Life"?

STRATEGY 2

. Ask students to recall a conflict which they witnessed or were part of. Have students write down their answers to the following questions and share their results in groups of two.

  - What was the cause of the conflict?

  - Why did it escalate?

  - How did it escalate?

  - Were the two sides able to communicate their points of view on the issues involved?

  - Were the two sides able to communicate their feelings?

  - What other choices could have been made to resolve the conflict?

  - What made this conflict a negative or positive experience?

. Have students identify a particular international conflict. Identify the two points of view operating in the conflict.

  - Are there emotional issues at stake as well as differing interpretations of the facts? If so, identify these.

. Bring in articles on several controversial issues, have students read the articles and have students, in groups of two, take turns roleplaying each side of an issue.

. Ask the students what would be the similarities and differences between this type of personal discussion of the issue and international conflict situations.

. Ask the students as a class to develop a set of guidelines or principles for settling disputes through discussion. Then distribute Worksheet 3 and ask students to improve their list of principles with the worksheet.

  - Which ones are the same?

  - Which are ideas you did not include?

  - Are there any principles with which you disagree? Why? Which, if any, of these are applicable to nuclear disarmament negotiations?

  - Are there additional problems in international negotiations which make any of these principles dangerous or ineffective? If so, explain.

STRATEGY 3

The following exercise is designed to help students become aware of some of the power plays used in communications and dialogue. As a beginning, set up a roleplay situation which might elicit some of the commonly used power plays. For examples, your teacher tells you only one of three students can get an A in this course.

. Have three students role play a three-way discussion in which each student makes a case that he or she is to have the A. Then follow up the roleplay by asking questions.

  - What were some techniques used on the part of more than one student to prove a point? How effective were the students? Why?

  - What techniques are sometimes used to "win" over another person by putting him or her at a psychological disadvantage?

. Distribute Worksheet 4, "Power plays to Communicate Your Message." Go over the list of techniques. Identify some that were used in the roleplay.

. Discuss with the whole class the strategies used, their relative effectiveness, and the students' reactions. Which seem fair, which unfair?

. Have students listen to a part of a speech by an international figure on T.V. or read from a newspaper. Ask students to identify some of the techniques used.

  - Did the speaker use any power play techniques as outlined on Worksheet 4? Explain.

  - What purpose did these serve?

  - Was the speaker successful in supporting his or her point? Why? Why not?.

. Ask students to think about power play techniques in negotiations on disarmament.

  - How do each of these guidelines suggest ways that the issue of nuclear technology is treated?

  - According to the philosophy that the "ends justify the means," it is all right for a person to use any unscrupulous method in order to achieve a desirable goal. How do you feel this applies to the nuclear issue?

  - Would any of these techniques ever be appropriate? Why? Why not?

. You may want the class to model one or more exchanges in which one of the techniques is used and two different responses are evoked. Have other students analyze which response was more effective, and why?

STRATEGY 4

. Distribute and have students read Worksheet 5, "The Health Costs of the Nuclear Arms Race."

. In small groups have students list some of the daily and long-range consequences spoken of in the article.

. Have the class reunite and list health consequences on the chalkboard.

. Have students explain their answers to the following questions:

- Who is at greatest risk?

- Who is at the least risk?

- How are these facts important to you personally?

- What can an individual do to lessen his or her degree of health risk from nuclear sources?

- What causes these health risks?

- What conclusions do you draw in relation to nuclear technology?

- "Citizens Call," a group located in Utah, distributed the information in Worksheet 5. Based on the information in Worksheet 5, do you consider "Citizens Call" to be an impartial group? A pro-nuclear group? An anti-nuclear group? Other? Explain.

STRATEGY 5

In Worksheet 6, Dr. Bernard L. Cohen, a former experimental nuclear physicist turned environmental scientist, compares low-dose radiation effects with other forms of risk behavior.

. Distribute Worksheet 6, "Radiation Risks in Perspective," and have students explain their answers to the following questions:

- Do you believe that Dr. Cohen is presenting a reasonable justification for nuclear technology? Why?

- How do you think Dr. Cohen would respond to the following quote from Worksheet 5: "If a miner breathes radon into his lungs, it may sit there for years, just irradiating a few cells in the lungs. Then 15 or 20 years later the miner might develop lung cancer....."?

- Do you agree or disagree with the author's statement that the long-term effect of radiation is "bound to be favorable"? Explain.

. Distribute Worksheet 7, "The Risks We Take." Have students react to the chart comparing exposure to low-dose radiation with other risks we take.

. Distribute Worksheet 8, "The Benefits of Radiation."

Despite the benefits of radiation as described by Dr. Allen Brodsky, a senior health physicist with the Nuclear Regulatory Commission, and despite the government radiation standards for safety, many people still fear that the current radiation limits may be inadequate. Have students explain their answers to the following question:

- Why do many people still fear that current radiation limits are inadequate?

. Have students react to the following statement by Dr. John W. Gofman, chairman of San Francisco-based Committee for Nuclear Responsibility and professor emeritus of medical physics at the University of California at Berkeley:

> "Benefit-risk analysis (of radiation) is simply and obviously a violation of every human's right not to be trespassed upon by pollutants of any sort, whether or not damage by the pollutants has been proven."

. Distribute Worksheet 9, "Risks/Benefits." Have students answer the question:

- Many people are becoming increasingly confused because of conflicting evidence provided by the scientific community. What further steps can be taken by the government and/or other interested citizen groups in helping the public make rational decisions about radiation, food additives, and other pollutants?

STRATEGY 6

. Ask students if they have heard of any accidents or false alarms in our nuclear weapon system.

- How possible do you imagine an accident to be?

  -- A long shot?

  -- Very possible?

  -- Probably not possible at all?

. Distribute Worksheet 10, "Nuclear Weapon Accidents and False Alarms" and Worksheet 11, "List of Nuclear Weapon Accidents in the United States."

. Have students explain their answers to the following questions:

- How many years do the records cover?

- In how many states did a near accident occur?

- Identify the accidents which occurred closest to your area.

- Do any of these facts surprise you? Explain.

- How do these statistics compare to what you thought?

- Do these facts make you feel that a safeguarding system does work?

. Bring up the policy we may have of "launching on warning" and that future weapons will be first strike weapons with very short flight times. What does this have to say about possible future accidents? (We won't be able to afford false alarms then because there won't be enough time to check out the system.)

- The risk of nuclear accident must be balanced against the need for military preparedness. As Caspar Weinberger, the Secretary of Defense, argues, "The threat of the Soviet Union is so great that all other considerations of domestic policy must be subordinated to it. If [we] have too little ready when the time comes, there won't be time to say 'too late.'" Where do you stand? Does the protection provided by our nuclear weapons outweigh the possible risks of accidents? Why? Why not?

- The accident at Three Mile Island occurred in 1979, after the last item on this list. Even if this list covered that point in time, however, why would Three Mile Island not have been included? Explain.

- What is the significance of this?

STRATEGY 7

. Ask students to imagine a 1-megaton bomb (seventy times the explosive power of the Hiroshima bomb) being dropped on New York City.

. Have them brainstorm what some of the results might be.

. Distribute Worksheet 12, "Short Term Effects of Nuclear War" and Worksheet 13, "Long Term Effects of Nuclear War." Have students read the worksheets and compare these facts to the students' original responses.

- What sort of feelings do you have after hearing some of the facts?

- Did you have a realistic assessment of the potential destructive power of a nuclear weapon?

. Break class into two groups - (short range effects and long range effects) - and ask a recorder to list all the possible consequences of a 1-megaton bomb being dropped on New York City.

STRATEGY 8

Distribute Worksheet 14, "Children of the A-Bomb" and Worksheet 15, "Hiroshima: A Survivor's Story." Give students time to think and react to the two readings by writing privately just single words or short phrases which come to their minds.

. Ask students to share their responses with a partner.

. Have students explain their answers to the following questions:

- Which person's experience was most difficult for you to read? Why?

- What would you say to either Takako or Shijeko expressing how you feel? (If appropriate, you might do this in a roleplay situation.)

- What are some thoughts and feelings you are left with in relation to use of nuclear weapons today?

STRATEGY 9

. Ask students if they know someone who died in one of the wars.

. Present the following list of United States war fatalities. Have students guess numbers before you list each one:

Civil War	500,000
W.W. I	260,000
W.W. II	400,000
Korea and Vietnam	100,000
* Nuclear War	140,000,000

* This is probably a conservative estimate of the immediate effects only.

. Have students explain their answers to the following question:

- What are some obvious results of nuclear war in relation to death, injury, and disease?

. To illustrate that there can be no possible effective medical treatment read students the following:

A good illustration for the point that there could be no possible effective medical response is given by Dr. Howard Hiatt, Dean, Harvard School of Public Health: "...the case of a badly burned 20-year-old boy who was treated at the Mass. General Hospital. In 33 days he required continuous monitoring by specially trained medical teams; 500 pints of blood and blood products; and 6 operations, each of several hours duration and requiring 2 teams of surgeons and other skilled personnel. Despite extraordinary care, he died after 33 days. This one patient stretched the resources of the hospital.... Now imagine the situation in a nuclear war, where the casualties would be in the tens or hundreds of thousands or even millions in a given city. Most medical facilities would be in ruins, and all other large cities would be in the same condition."

. Distribute Worksheet 16, "Nuclear War's Effect on the Mind." Have students read the article and share their feelings first in small groups and then with the entire class.

STRATEGY 11

. Identify a local newspaper common to students.

. Pick a date for the newspaper--perhaps the year 200 when the U.N. is having a World Peace Celebration.

. Ask the group to imagine headlines for possible news stories--envisioning a positive view of the future.

  - What are schools like in this year?

  - What famous people are being interviewed and why?

  - Imagine you are mentioned in the paper. What are you doing?

  - Allow time to return to the present and look at it through new eyes. What are the things you and people around you are doing now that could help bring about one of the future reasons that have been discussed?

. Read Martin Luther King's "I Have a Dream..." speech.

  - What was his vision?

. Use John Lennon's song "Imagine." Discuss his vision.

. In small groups, ask students to formulate some steps that might be useful in moving toward their vision of the future.

. Have one student from each group record the discussion and report back to the entire class.

. Distribute Worksheet 18, "Dear Student." Discuss the letter with the class.

NOTE: The following resources were particularly helpful in planning this section:

Facing the Facts, "A Series of Flip Charts on the Nuclear Arms Race and the Nuclear Weapons Freeze," produced by Traprock Peace Center and Peace Development Fund, Keets Rd., Deerfield, MA 01342.

"Educators for Social Responsibility Curriculum--III--Junior High and High School."

Section II

Nuclear Issues — Worksheets

Worksheet 1

Student Questionnaire

1. NAME (optional), AGE, AND SEX OF RESPONDENT _____

2. List any ideas or images that come to you when you hear the word "nuclear."

_____

_____

3. How old were you when you were first aware of nuclear issues? What do you remember thinking? How is that different/the same from what you think now?

_____

_____

_____

4. What do you know about nuclear energy? What are some of the possible problems and benefits of nuclear energy?

_____

_____

_____

5. When has your awareness of nuclear issues been greatest? When least?

_____

_____

_____

6. What do you know about civil defense (protection for the civilian population)? What do you think about civil defense?

_____

_____

7. Can you remember and describe a dream about nuclear weapons or nuclear war?

_____

_____

_____

Student Questionnaire (continued)

NAME (optional), AGE, AND SEX OF RESPONDENT _____

8. Do you think that a nuclear war will occur within our lifetime? _____
   Do you think the threat of nuclear war is becoming greater? _____
   remaining the same? _____ diminishing? _____ Do you think
   that you could survive a nuclear attack on our city? _____ our
   country? _____ the world? _____

9. How has the threat of nuclear war affected your thinking about:

   the future?
   the world?
   time?
   marriage?
   having children?
   other? _____

_____

_____

_____

_____

_____

10. Have you ever expressed feelings of fear about the threat of nuclear war to other people before today?

_____

_____

11. Which topics do you wish you knew more about?

Physics of nuclear weapons	( )
Human dimensions of nuclear war	( )
Soviet-American relations	( )
Economic effects of the arms race	( )
The nuclear arms race and arms control	( )
The effect of nuclear war	( )
Nuclear energy and energy resources	( )
How adults are responding to the nuclear threat	( )
How students can respond to the nuclear threat	( )
Other _____	( )
Other _____	( )

Worksheet 2

The Double Life (Psychological Effects)

A Yankelovich, Skelly, and White poll found widespread ignorance among the public about what nuclear weapons do and a deep latent concern about them. Most people felt the problem was beyond their control. A 1981 Gallup poll found that 68% of the people believed that nuclear war might happen within ten years; only 9% thought they had a good chance of surviving.

The psychological defense mechanisms we use to fend off this reality can have short-term adaptive value for the individual in that they protect one from feeling terror and guilt. But because they impair our perceptions of reality and prevent us from taking action, they increase the likelihood that nuclear war will occur.

> Numbing: "The closing off of thought and emotion toward present danger and future catastrophe is both a cause and effect of the arms race.... Our capacity for 'healthy' fear and for deep caring about others is impaired."
>
> -- Mark Sommer

Two of the defense mechanisms cited by International Physicians for the Prevention of Nuclear War are: Avoidance: regarding the problem as too big to handle, too technical; leaving it to others, the leaders and experts, to solve. Dehumanization: denying any human value or worthy motives to our adversary in order to justify our hostility.

> "This pain is repressed and denied by most of us. Why? Because successful people are optimistic and keep smiling. Because it hurts, and there is no pill for it. Because we fear we'll dissolve or fall apart if we let ourselves feel it. This denial takes a disastrous toll. It saps our energy. It isolates us. The denied grief and anger erupt in other forms -- are directed inward in self-destructive behavior, or outward in acts of violence against society. Denial of feeling, furthermore, erects a barrier against any threatening information. That is why, in campaigns to arouse the public to the dangers facing us, information is not enough. Feelings must be dealt with."
>
> -- Joanna Macy, "The Web and the Work"

> "...As you confront the life and death issue of the bomb, you develop a heightened sense of why you want to keep life going. But there is no pushing the nuclear question aside, no pretending that it doesn't threaten everything that matters to us, no resigning ourselves to its pervasive presence. There is no other issue, if we can't solve this, the nuclear issue."
>
> -- Robert Jay Lifton

Worksheet 3

Engaging in Effective Dialogue

Important principles underlie effective communication and negotiation, as Roger Risher points out in his book Getting to Yes. He believes that these principles apply to disagreements between friends, family members, tenants and landlords, bosses and workers, partners, factions, and nations. The following are among the principles he stresses:

* When arguing or negotiating, don't get locked into positions -- a statement of what you are willing or unwilling to accept or do. Arguing over positions tends to make both parties act defensive and lock themselves into their positions (in order to "win," be "right," convince the other person, "save face").

* Positions usually develop from underlying feelings, concerns, needs, hopes, fears. Share your concerns, discover the other person's concerns, and discuss ways to resolve differences or conflicts.

* Enter the discussion with the idea of working together to resolve differences; don't set up an adversary (us against you) relationship where each side becomes so defensive that neither pays attention to the other's legitimate interests.

* Focus on how the issue affects you; not on what the other person does or on your judgment of him/her. ("I feel as if my opinions don't count" instead of "You never listen to students' opinions... You're insensitive.")

* Don't assume that you know what the other person thinks or intends to do. Try to see the situation as the other person sees it, feels it.

* Don't have your solution figured out in advance; be open to working out the solution with the other person. Allow him/her to participate in the process. Also, don't assume that there is one best answer to the problem. Create/be open to several possible solutions before considering/deciding upon solutions.

* When interests conflict, resolution should be based on some fair, objective standard (such as precedent, moral or legal standards, equal treatment).

Worksheet 4

Power Plays in Communication and Dialogue

1. Name-calling, labeling, insulting: "You are ungrateful and lazy! Everyone does a fair share of work around here but you."

2. Mind-reading, telling the person what his or her motivations are: "You think that by waiting, someone else will do your dishes for you... You're just purposely trying to aggravate me... You know I want the dishes done, and you just want to get me angry."

3. Exaggerating, and using emotionally-charged words: "I can never trust you to do anything you're supposed to do... You think you're better than everyone else; you always try to get out of your responsibilities."

4. Playing the victim, making the other person feel guilty: "I had a hard day at work, and I'm really tired." (sigh). "I guess I'll go in and get those dishes done so they're off my mind, even though it's really your chore."

5. Phony issue, talking about everything but the issue at hand: "Look at you, just sitting around. No wonder your grades are so low this term! Another thing, I want those clean clothes of yours put away. And if you're awake late tonight, I don't want to have to listen to your stereo again like last night!"

6. Rhetorical question, often in combination with exaggeration or mind-reading: "You just want me or somebody else to do your dishes for you, don't you? You think that by sitting there, someone else will do your chores for you, right?"

7. Silent treatment, snubbing: Walk around the room, sigh, glare, etc. -- but don't say a word. Give the student the cold shoulder.

8. Assertive, saying what you think without laying any trips on anyone else: "I want you to do the dishes now. It's your turn tonight and we all agreed that we'd do them right after dinner when it's our turn."

Worksheet 5

The Health Costs of the Nuclear Arms Race

SUBJECT:

1. The design and manufacture of nuclear weapons is a civilian responsibility in the U.S. Research is done in three huge laboratories in the U.S. Livermore Laboratories, California, and Los Alamos Laboratories, New Mexico, are both sponsored by the University of California and operated by the Department of Energy. The third, Sandia Laboratories, is operated by Western Electric Co. (a subsidiary of American Telephone and Telegraph Co.) at Albuquerque, New Mexico.

2. The making of weapons begins with the mining and milling of uranium, a mineral found abundantly in the Rocky Mountains and Great planes states. Each step of the nuclear fuel cycle emits radiation. When uranium is mined it gives off a gas which is radioactive. This gas is called radon. If a miner breathes radon into his lungs, it may sit there for years, just irradiating a few cells in the lungs. Then 15 or 20 years later the miner might develop lung cancer. Uranium mining and milling presents a hazard not only to the miners but also to the region as a whole; by depletion and contamination of scarce water resources and by exposure of the general population to radioactive contamination, countless thousands are at risk from windblown dust and radon gas from the huge piles of radioactive tailings left by uranium mines and mills.

3. Uranium can be used to fuel nuclear reactors which convert some of the uranium into another fissionable element, plutonium. Uranium and plutonium are used in bombs. Both can also be used as fuel for nuclear reactors that produce electricity. Plutonium, dispersed as dust--one microscopic grain of it can cause lung cancer. Its radioactivity can remain lethal for a quarter of a million years. High incidences of cancer and leukemia are found among people living near Rocky Flats plant near Denver, Colorado (does fabrication and assembly of plutonium "trigger" systems that ignite thermonuclear bombs) and Savannah River Plant in South Carolina (major nuclear weapon materials production center).

4. Up to now, 99% by volume of all high-level nuclear wastes (the most radioactive) in the U.S. has come from nuclear reactors for military purposes. The purposes include nuclear weapons production and

naval propulsion reactors. Seventy-five percent of low-level (less radioactive but still potentially dangerous) nuclear wastes have also come from military-related activities.

Radioactive wastes emit gamma rays and atomic particles that can injure or kill living things. This radiation may kill cells or damage the genetic material essential to reproduction. Very high levels of exposure to radiation can make people sick and kill them very quickly. Lower levels of exposure can cause cancer, sterility, or birth defects.

Nuclear wastes can be dangerous to human beings not only through direct contact, but also by getting into water supplies or the food chain of plants and animals that we eat. Some radioactive materials stay dangerously radioactive for thousands of years.

The nuclear establishment today includes: 130 uranium mill sites, 3 enrichment facilities, 72 major commercial nuclear reactors, 9 weapons production facilities, 3 reprocessing centers, 20 waste disposal sites, 30 Dept. of Defense and Dept. of Energy reactors, 148 Navy reactors, 51 weapons storage and deployment sites. In addition, the transportation of nuclear materials between various states of the fuel cycle brings radioactive substances through countless communities.

CITIZENS' CALL is an organization of and for victims of radiation exposure from the Nevada Nuclear test site; it concerns itself with all phases of the nuclear weapons cycle. Activities include postcard campaign on Comprehensive Test Ban; Senate Bill 1483 for compensation of radiation exposure. Contact: 126 South 1400 West, Cedar City, Utah 84720, Phone (801) 586-6674.

Worksheet 6

Radiation Risks in Perspective

Since 1 millirem is a typical radiation exposure in highly publicized incidents—for example, the average exposure received by nearby citizens in the area of the Three Mile Island accident in Harrisburg, Pennsylvania, was 1.2 millirems—let us pause to give some perspective on the dangers of 1 millirem exposure. As already noted, such exposure has one chance in eight million of causing a fatal cancer, which corresponds to reducing life expectancy by 1.1 minutes. This is the amount of life expectancy we would lose from taking three puffs on a cigarette, eating ten extra calories (e.g., one lick on an ice cream cone) if we are overweight, or being exposed to typical city air pollution for one week. (See Worksheet 15.)

In addition, 1 millirem of radiation can cause genetic defects in our progeny. A continuous exposure of the entire U.S. population over several centuries to an additional 1000 millirems up to the age of child conception would increase the frequency of genetic defects by 0.2 percent. Since the average age of conception is thirty years, this is equivalent to exposure to 33 millirems per year. Continuous exposure to 1 millirem per year would therefore increase genetic defects by (0.2 percent 33 =) 0.006 percent.

Ordinarily genetic defects arise from spontaneous mutations in the sex cells, which are essentially chemical reactions. It is a well-known fact that increasing the temperature accelerates chemical reaction rates, and that the rate of spontaneous mutations increases very rapidly with temperature. It is widely believed that the anatomy of the male—with the gonads outside the body—is evolution's way of reducing their temperature and thereby reducing the frequency of genetic defects. The wearing of pants largely frustrates this process, raising the temperature of the gonads by about 3.3° Centigrade, and it is widely believed that this contributes substantially to genetic defects in humans. Judging from animal studies, scientists estimate that this heat doubles the rate of mutations, but even if we assume that it increases this rate by 15 percent, charging this to the typical 5000 hours per year of wearing pants, each hour per year of pants-wearing increases genetic defects by (15 percent 5000 =) 0.003 percent. We thus see that the genetic risk from 1 millirem of radiation is equivalent to about two hours of wearing pants.

The popular notion that genetic effects can do long-range harm to the human race is absolutely false. Genetic selection, otherwise known as evolution, acts to breed out bad mutations and breed in good mutations, so the long-term effect of additional radiation is bound to be *favorable*, rather than unfavorable, because as the centuries go by good new traits are bred in and bad new traits are bred out. Genetic effects of radiation are considered to be bad because in the short term (i.e., over a few generations) they cause birth defects. However, the long-term effect of radiation is negligibly small, and represents no danger to the human race.

Another perspective on genetic effects of radiation may be derived from studies of the Japanese A-bomb survivors. There were about 24,000 in the group who were exposed to an average of 130,000 millirems each, but in the first generation of children born to these people there is no detectable excess of genetic defects.

Source: "Exaggerating the Risks", Bernard L. Cohen, Nuclear Power: Both Sides, Edited by M. Kaku and J. Trainer, N.Y.: W. W. Morton & Co., 1983

Worksheet 7

The Risks We Take

Activity	Shortened Life Span (in minutes)
Drinking a diet soft drink	0.15
Crossing the Street	0.4
Being exposed to 1 millirem of radiation	1.5
Smoking cigarette	10
Drinking a nondiet soft drink	15
Eating a calorie-rich dessert	50
Flying coast to coast	100
Driving coast to coast	1000
Skipping annual Pap test	6000
Choosing Vietnam army duty	600,000

Source: B. Cohen and I. Lee, "A Catalog of Risks," Health Physics 36 (1979): 707-22.

Worksheet 8

The Benefits of Radiation

I have talked at length about the ways in which the dangers of radiation have been distorted. Now let us turn to the many major benefits to be derived from radiation, aside from the electricity generated by nuclear power plants.

Radiation has cured hundreds of thousands of patients and improved the quality of our lives. When we ride safely and comfortably in high-speed trains, jet planes, or cars, we have the satisfaction of knowing that the machinery has been tested for strength and reliability by radiographs made by high-energy gamma rays from by-products of nuclear energy. Gamma rays and x-rays from radioactive materials are used to detect the smallest defects in turbine blades, high-pressure steam boilers, and other potentially dangerous machinery. Mechanical failures and transportation accidents have been greatly reduced, while the comfort and safety of the ride have been improved.

In medicine, radiation and radioactive pharmaceuticals are among the chief diagnostic tools in every hospital in the country. We tend to forget that before the use of radioactive materials in nuclear medicine, doctors often relied on exploratory surgery or educated guesses to diagnose patients. Today doctors routinely inject minute quantities of radioactive chemicals into our bodies to examine the health of our organs, locate tumors, detect malfunctions of the thyroid glands, and determine the chemical balances in our bodies. Radiation is also used in cobalt therapy to treat *one-half* of all cancer patients. (Radiation can cure certain forms of cancer by killing cancer cells much more readily than healthy cells.)

In farming and agriculture, radiation has helped keep down our food prices by ensuring the health of farm animals and crops. For example, at one time the screw worm fly was infesting cattle throughout the Southwest, which resulted in higher beef prices. By using radiation to sterilize the screw worm fly, this multi-million-dollar pest was eradicated almost overnight.

In criminology, radiation has opened up a new area of crime detection. Tiny fragments of paint, hair, cloth, dirt and so forth left at the scene of a crime can readily be identified by radiation. Scientists irradiate the fragments with neutrons until the samples themselves become radioactive, whereupon they can be identified much as if each sample were fingerprinted. Using this same method of detection, police have exposed art forgeries by having a laboratory examine the chemicals found in the paints.

Thus radiation is used in myriad diverse ways in our modern society. It is used to measure anything from a wine's copper content, which has an important bearing on the taste, to the chemical content in a river, where a nearby factory could be discharging poisonous heavy metals into the water.

"Protecting the Public", Allen Brodsky, Nuclear Power: Both Sides, Edited by M. Kaku, and J. Trainer, N.Y.: W. W. Morton & Co., 1983.

Worksheet 9

Risks/Benefits

Fig. 2-2 Drawing by S. Harris. © 1979 The New Yorker Magazine, Inc.

Worksheet 10

Nuclear Weapons Accidents

Nuclear Weapons Accidents

1. Vary in type of system involved and degree of seriousness.

2. Have occurred during assembly, dismantling, storage, and transportation of weapons and materials as well in the collisions of planes and submarines.

3. Nuclear detonation in an accident is possible, but very unlikely because of redundant interlocking safety mechanisms. (However, note Example 1 on the chart.) Accidents have set off the conventional explosive contained in nuclear weapons, scattered plutonium over wide areas, and killed and injured dozens of people.

4. As nuclear technology becomes more complex, the chances of accidents increase, despite the best safety precautions and most advanced training for operating personnel.

False Alarms

1. "During 1979 and the first half of 1980, U.S. early warning computers set off 147 false alerts, four of which actually escalated forces to a higher state of readiness. Had the U.S. been operating under a launch-on-warning strategy, requiring it to fire endangered missiles immediately, the consequences would have been disastrous." — Robert Aldridge, former aeronautical engineer with Lockheed.

"These 147 alerts required evaluation to assess "attack"; during this same period the Senate Armed Services Committee noted that there were also 3556 other false alarms which did not require evaluation.

2. The Pentagon's early warning system consists of several systems capable of detecting Soviet nuclear attacks only seconds after they are launched, including ground-based radar near the Arctic Circle, infra-red satellites able to detect missile exhaust, and radar off the Massachusetts coast able to pick up sub-launched missiles. The information collected by these systems is continually fed to computers at several locations. Upon receiving signs of an attack, preparations are immediately begun for launching U.S. forces while officials monitor new information and decide whether to inform the President. It takes Soviet ICBMs thirty minutes and SLBMs about fifteen minutes to reach the U.S.

RESOURCES: Nanauer, Gary. "The Story Behind the Pentagon's Broken Arrows," Mother Jones, April, 1981.
Talbot, Steven. "The H.Bombs Next Door," The Nation, January 7, 1981.
"U.S. Nuclear Weapons Accidents: Danger in Our Midst," The Defense Monitor.

Worksheet 11

List of Nuclear Weapons "Accidents" in the U.S.

Place	Weapons System	Date
Fairfield-Suison, CA (Details unspecified)	Unspecified	8/5/50
New Mexico (B-36 bomber dropped an atomic bomb on barren territory near Kirkland AFB.)	B-36 Bomber	1956
Spokane, WA (B-52 crashed on take-off. The news report at the time spoke only of "a training mission," and made no mention of a weapon.)	B-52 Bomber	12/12/57
Hunter AFB, Georgia (B-47 bomber, mid-air collision, accidentally jettisoned part of a nuclear weapon. Weapon was in a transportable condition and not capable of a nuclear explosion.)	B-47 Bomber	2/5/58
Off Savannah, GA (Details unspecified.)	B-47 Bomber	2/12/58
GA coast (B-47 bomber jettisoned an atomic bomb off the GA coast following a mid-air collision. This was listed as an "incident", not an "accident".	B-47 Bomber	3/5/58
Florence, S.C. (B-47 from Hunter accidentally jettisoned an unarmed nuclear weapon because of a malfunction of the plane's bomb-lock system.)	B-47 Bomber	3/11/58
Texas (B-47 crashed after take-off from Dyess AFB, Texas. The crash was the result of a fire.)	B-47 Bomber	11/4/58
Louisiana (B-47 caught fire and burned on the flight line at Chennault AFB, Louisiana.)	Nuclear weapon in transit	11/26/58
Louisiana (C-124 transport plane carrying an unarmed nuclear weapon crashed and burned on take-off from Barksdale AFB, Louisiana.)	Nuclear weapon in transit.	7/6/59
Kentucky (B-52 bomber carrying 2 unarmed nuclear weapons collided with a KC-135 tanker plane near Glen Bear, Kentucky. Both bombs were recovered undamaged.)	B-52 Bomber	10/13/59
New Jersey	Bomarc surface-to-air missile	6/8/60

List of Nuclear Weapons "Accidents" (continued)

Place	Weapons System	Date
(Bomarc air-defense missile site at McGuire AFB, N.J., caught fire. Fire and 2 explosions severely damaged 1 of the missiles, which carried a nuclear warhead.)		
Monticello, Utah	B-52 Bomber	1/19/61
(B-52 exploded in the air.)		
North Carolina	B-52 Bomber	1/24/61
(B-52 from Seymour-Johnson AFB, Goldsboro, N.C. carrying unarmed bombs crashed 15 miles north of the base.)		
California	B-52 Bomber	3/14/61
(B-52 from Beale AFB, CA, on an airborne alert training flight crashed with unarmed bombs on board.)		
US Atlantic coastline	N-powered attack sub, Thresher	4/63
(Sub lost [it is unclear whether the Thresher had Subroc on board, which carried a Nuclear warhead])		
Cumberland, Maryland	B-52 Bomber	1/13/64
(B-52 from Turner AFB, GA, crashed near Cumberland, Maryland. Carried 2 unarmed bombs.)		
Peru, Indiana	B-52 Bomber	12/8/64
(B-59 Hustler bomber caught fire and burned on the flight line at Bunker Hill AFB, Indiana. It carried an unarmed bomb.)		
Ohio	N-weapon components	10/12/65
(C-124 transport caught fire and burned during refueling stop at Wright-Patterson AFB, Ohio. N-weapons were not carried on the plane, but non-explosive components of nuclear systems were.)		
Off US Atlantic coastline	Unspecified	Unspecified
Tennessee River	Corporal miss. w/nuclear warhead	"Before '61"
(The missile rolled off a truck and into the Tennessee River.)		
New Mexico	Train Accident	12/3/62
(A train involving a courier car and 2 box cars containing weapon components - no high explosives - derailed.)		

List of Nuclear Weapons "Accidents" (continued

Place	Weapons System	Date
Little Rock AFB, Ark.	Titan II ICBM silo	8/9/65
(Explosion in missile silo, followed by fire.)		
Jacksonville, Fla.	Surface-to-air n-missile, Terrier	1966 (?)
(A missile was dropped while being handled above deck of USS Luce, a guided missile frigate (which carries 40 Terrier missiles).		
Atlantic, off Vir.	US carrier, Essex, & US N-sub, Nautilus	11/10/66
(The 2 vessels collided in a training exercise. Repairs on the Nautilus took over 2 months to complete.)		
70 mi. SE of Charleston, S.C.	Polaris sub., Simon Bolivar	8/31/67
(Collided with a target ship during torpedo practice, carrying 16 "unarmed" Polaris missiles.)		
150 mi. SE of Boston	A prototype US n-sub, Seawolf.	2/1/68
(Struck sea-bed and damaged rudder.)		
Off Vir. capes	US aircraft carrier, Wasp	6/12/68
(Collided with oiler ship Truckee.)		
65 mi. east of Cape Cod	N-powered attack sub, Seawolf	1969
(Went aground while submerged. Damage to bow and stern.)		
Charleston, S.C.	Polaris missile submarine	1/30/70
(Sub ran aground on Sullivan's Island during think Fog.)		
Off Cape Henry, Vir.	Polaris missile sub Daniel Boone	5/28/70
(Collided with Philippine merchant ship, the Pres. Quezon. Damage to sub was minor.)		
Groton, Conn.	Polaris missile sub Ben Franklin	4/11/72
(Collided with tugboat. The tug sank, there was no reported damage to the submarine.)		
150 mi. off Cape Hatteras, MA	N-attack sub. Tullibee	10/6/72
(Collided with W. German ship.)		

List of Nuclear Weapons "Accidents" (continued)

Place	Weapons System	Date
Norfolk, Vir.	N-attack sub Finback	1/8/74
(A submarine rescue ship collided with the Finback; minor damage.)		
Jones Beach, Long Island	Transport helicopter	6/26/74
(A CH-47 helicopter ferrying nuclear weapons from Long Is. to N.J. made a forced landing.		
Near Lanai, Hawaii	N-attack sub, Swordfish	2/15/75
Yucca Flats, Nev. nuclear test site	Small nuclear warhead	10/23/75
(A canister containing a 20-kt. bomb fell 40 ft. down a nuclear test shaft. No radiation leakage was reported.		
Off Fla. coast	Aircraft carrier Saratoga	Dec., '75
(Collided with the oiler Mississineva. "The Saratoga's hull was ripped open...")		
New London, Conn.	N-attack subs, the Archerfish and the Philadelphia	9/30/77
(Collided stern to stern at slow speeds. Minor damage. [US nuclear attack subs are armed with the SUBROC, a nuclear depth bomb produced by Aerospace. The SUBROC has a nuclear warhead and is meant to be used against enemy subs.])		
Warner Robins, GA	B-52 bomber vandalized	2/6/78
(SAC B-52 bomber reportedly armed with short-range attack missiles and nuclear warheads was vandalized at Robins AFB. One missile had been tampered with but was not damaged.)		

Worksheet 12

Immediate Effects of Nuclear War

VOCABULARY

1 megaton - the equivalent of 1 million tons of TNT, 70 times the explosive power of the Hiroshima bomb.

psi - pounds per square inch of pressure over the normal pressure in the atmosphere at sea level (14 pounds per square inch)

rem - roentgen equivalent man units; an index of the biological effects of different types of radiation on a human being. 100 rem: about 10% of people, particularly children, the elderly, and the infirm, will die within a few weeks; the remainder will suffer from radiation illness. 600 rem: acute radiation illness. 1000-3000 rem: fatal.

1. The type of explosion described here is at ground level. It is likely that, to maximize the area of damage (greatest in an air burst) and the fallout effects (greatest in a surface burst), an actual attack on a population center would include both types of explosions. It could also include bombs larger than the 1-megaton described here. It is also likely that, rather than one bomb, several would fall on a target, creating interlocking circles of damage.

2. According to the Defense Civil Preparedness Agency, high risk areas are based on the following criteria listed in descending order of priority:

   a. U.S. military installations.
   b. Industrial, transportation, and logistics facilities which support the military.
   c. Other basic industries and facilities which contribute significantly to the maintenance of the U.S. economy.
   d. Population concentrations of 20,000 or more.

3. Burn - A nuclear explosion releases enormous energy in a millionth of a second. The temperature around it rises to 15-20,000 times the temperature of the sun's surface. If the fireball touches the ground, it evaporates everything--concrete, steel, rock. Light and heat energy set fires miles away.

4. Blast - The explosion compresses the air and creates moving shock waves with winds many times the force of a hurricane. While "overpressure" directly causes some casualties, most damage comes from indirect effects: buildings will collapse, debris will fly through the air, windows will turn into particles of glass travelling more than 100 mph.

5. Fallout - Particles of vaporized soil and debris are drawn from the crater of a surface burst, made radioactive in the fireball, and then condensed in the upper atmosphere before falling back to earth. Wind speed, weather, and terrain affect fallout. Symptoms of radiation sickness: nausea, vomiting, diarrhea, loss of hair, ulceration of the skin, bleeding.

6. These are only the immediate effects. Delayed or long-term effects are not generally included by medical planners in their estimate of destructive capability.

Worksheet 13

Long-Term Effects of Nuclear War

1. Ozone Layer - Absorbs much of the sun's ultra-violet rays. National Academy of Sciences stated that if 10% of the U.S. and U.S.S.R's weapons available in 1985 were exploded, 70-80% of the ozone layer above the Northern Hemisphere and 30-40% above the Southern Hemisphere would be depleted. Twenty percent depletion blinds all unprotected eyes, including all animals and insects. Result: ecological catastrophe.

2. Earth Scorched and Irradiated - Bikini Island in the Pacific, 18 miles from site of 15-megaton bomb test in 1954, is still too radioactive to live on. U.S. Interior Dept. estimates it will remain uninhabitable for 30-60 more years.

3. Food and Water - The average U.S. citizen uses 50-150 gallons of water a day; in the post-attack period, there would be at best a quart a day per survivor, with no easy way to determine contamination. Also, it would not require very large climatic changes to alter profoundly the production of food.

4. Radiation Sickness - Nausea, vomiting, diarrhea, loss of hair, ulceration of the skin, bleeding. Lowers resistance to infection. Epidemic disease likely due to hundreds of thousands of decomposing corpses, no safe water supply or sanitation, survivability of disease-carrying insects, survivors' suffering from malnutrition and altered immunity.

5. Cancer - People are still dying from the effects of the bombs dropped on Hiroshima and Nagasaki. Enough generations have not lived since then to demonstrate the magnitude of genetic damage; but a striking increase in leukemia and other malignancies would be observed among long-term survivors. It would be most severe in those who were children at the time of exposure.

6. Lack of Medical Treatment - Medical resources would be incapable of coping with those injured by blast, thermal energy, and radiation. 80% of physicians would die. 80% of hospital beds would be destroyed. Stores of blood plasma, antibiotics, and drugs would be destroyed or severely compromised. Food and water would be extensively contaminated. Transportation and communication facilities would be destroyed.

7. Profound Psychological Shock - "In Hiroshima, survivors not only expected that they too would soon die, they had a sense that everyone was dying, that 'the world is ending.' Rather than panic, the scene was one of slow motion--of people moving gradually away from the center of destruction, but dully and almost without purpose....The question so often asked, 'Would the survivors envy the dead?' may turn out to have a simple answer. No, they would be incapable of such feelings. They would not so much envy as, inwardly and outwardly, resemble the dead." --R. J. Lifton, M.D., and Kai Erikson, New York Times, March 15, 1982.

RESOURCES: The Bulletin of the Atomic Scientists, June/July 1981.
Schell, Jonathan, The Fate of the Earth.
Federation of American Scientists Public Interest Report, "Effects of Nuclear War," Journal of the Federation of American Scientists, Feb. 1981.

Worksheet 14

Children of the A-Bomb by Dr. Arata Osada

Takako Okimoto - 8th grade girl. In 2nd grade in 1945.

The 6th of August 1945--which I do not forget--the things that happened this day are deeply carved in my heart. That cruel war that snatched away so many precious human lives in one second--even now I shudder when I think of it. I am all alone after losing my father and mother and all my brothers and sisters. And no one can take their place. All of them, as a result of that A-bomb, were struck down one after another. My oldest brother was never found after he left to work with the Labor Service Group. My second brother's whole body was covered with burns and he died the next day at the Koi Grammar School. We left his body there at the Koi school and Father and Mother and the rest of us returned to the country. Since there were no good doctors in the country, my mother returned to town for treatment. At night a man came saying that she had suddenly become worse and called us back to town. When we arrived a strange, bad odor was rising everywhere, and the sights we saw! Everything imaginable was in ruins. You could not see a trace of the former Hiroshima. When we somehow managed to reach home we found that Mother had breathed her last a few minutes before. I cried for all I was worth. We cremated Mother's corpse on the stony river bed. Here and there all along the shore people were cremating corpses. And that evening just after we arrived back at my uncle's house in the country with Mother's ashes, my big sister died. Because I was still so little I didn't know what I ought to do but I put all my energy in nursing the father and sister who were left to me. But my little sister who was so cute died the day after my big sister's funeral. Father was able to go to my big sister's funeral but he no longer had any strength to get up for my little sister's funeral. I wonder whether the priest who came for my sisters' funerals had also breathed the poison? He was no longer around at the time of Father's funeral.

As they all died like this one after another, there is no doubt that my father who lasted the longest must have lost all hope.

But even so when I asked him, "Father how are you this morning?" Father always answered to keep my spirits up. "This morning I feel a little better."

The fact was, his bodily health kept getting only worse. Full of anxiety over me because he was leaving me all alone, Father departed from this world.

Before he died, Father often said "Father doesn't want to die. Since our house and our clothes have all been burned by the A-bomb, let's both of us go in our rags to the country and be farmers." He said this often.

Worksheet 14 (continued)

On the 15th of August Japan finally became a defeated country. Many beggars appeared in front of the station, and thieves and armed bandits have turned up one after the other, and it has become a world where you aren't safe for a minute.

What has caused this sort of thing? It is because of war. If there were no wars such miserable people would never appear and the world would always be a place of peace. In the new Constitution, renunciation of war is determined.

Even if it isn't a case of war between one country and another, even inside the country of Japan, in spite of the fact that we are the same kind of people, there is always war going on. As long as this is the case we will not become a peaceful country. In order to build a peaceful country, I believe we must first be considerate of each other.

Worksheet 15

Hiroshima — A Survivor's Story

When the bomb dropped, I was in junior high school seventh grade. At that time, Hiroshima was so crowded they had to tear down some of the houses to make wide streets so that we could get out of town in case bombs dropped. So the young students cleaned up the wreckage of the houses by hand, picked up the building material and dumped it into carts--stuff like this. At 8:15 in the morning I had just gotten to the working place with my friend and classmate.

I heard the airplane and I looked up and saw something drop. At the same time--almost at the same time--a strong explsion. I felt it knock me down. The next thing I knew, all was dark, red and gray; it was what you can imagine you see inside of a burning fire, when you open a burning furnace--like that. Red and black and gray all around me.

At that moment I didn't feel any pain, any hurt, nothing. I was so numb, I was so shocked. I just wondered what was going on. I knew a bomb dropped. I thought it dropped on top of my head. In a few minutes, I don't know how long, the fire began to go away. It began to clear and I could see. Sort of like a gray dark afternoon. It was a very clear morning that morning, but it was very dark then. That must have been dust, ashes.

Then I looked around and I could see people moving. And what those people looked like you never could imagine--like nightmares. I thought I had been sent to some other country, another space. People didn't look like people anymore. All their clothes were torn, they were bleeding, their skin hanging off, covered with ashes and dust and hair burnt off. Just incredible. Like a monster. Not running fast, but just barely moving. The faces silent. I didn't hear any sound.

Of course, I didn't know which way to go. I was so lucky I went out, instead of toward the center of the city. I followed the people and went to the river. So many people came, there were people pushing each other into the water. And I was afraid that someone might push me into the water. But I escaped. I was very lucky that way. Also, nothing fell on me. People are under the house, they are not dead, but they can't get out. They scream for help, but who can help? Everybody is hurt. Just incredible.

After I crossed the river, I tried to go to my school on the other side of the mountain. I finally got to the schoolyard. I sat down; then I don't remember when they brought me inside the door. It was days until I was treated. No food. Every once in a while they gave me a little water on my lips. They didn't give me water to drink. I didn't know which was day or which was night. I dreamed of water, of rivers, of oceans, of fountains, drinking water, swimming in water.

I wanted water. Every once in a while I woke up and gave my name and address so that people could tell my parents. On the fourth day, I heard my mother calling my name and I answered her and they took me home.

What a miracle! All those days. My mother went every day; place to place, calling my name, looking all over. On all the streets were dead bodies. She would see a young kid and look at the face, look at the faces, the dead bodies, looking all over. And finally the fourth day she found me. Four days, nothing to eat, no treatment, and one third, more than one third of my body was burnt. I survived. I feel that it really was a miracle.

Of course, when I first saw my face, I couldn't believe it. I felt like ice-cold buckets of water poured into my body. That kind of feeling. I got chilly...horrible feeling. Thank God, Time...day by day, Time helped.

I was very lucky. They never found my friend. Maybe she went in toward the center; we'll never know. When I came to, myself, she wasn't there. We were so confused, we all looked like different people. Maybe she was there. Maybe I didn't recognize her. I don't know. I think about her now, about all those people who died in the war.

If we make another mistake, start a new war, those people's deaths will mean nothing. They were sacrificed for us and their spirits will be peaceful if we are peaceful. We have to remember, so that our children will not have to suffer those horrible wars.

You don't have to be in a high position, or be extra smart in order to help the world find peace. People who are poor, who are uneducated, they can help us work for peace in the world. All they need is their hearts. Because I am myself not an educated person, I'm not a good speaker, I'm not especially trained, just an ordinary, uneducated woman. But I wanted to help and so I tell the world my experiences. People need to be encouraged, because some people are afraid to do things. They think, "I cannot do it myself. A group will do it. By myself I can do nothing." Many people feel that way, I'm sure. But little things are important. It is an old Oriental saying that, "If a little dust gets together, it makes a mountain."

-- Shigeko Sasamori

Shigeko Sasamori was one of the twenty-five Japanese girls, survivors of the Hiroshima atomic blast, whom Norman Cousins brought to the United States in 1955 for plastic surgery; her story is in his book Present Tense. She now lives in Los Angeles, practices shiatsu, and works at Cedars-Sinai Hospital as a night nurse caring for newborn babies.

In the past year Sasamori has become an outspoken proponent of peace, addressing groups and gatherings all over the U.S. She has been through the most terrible of human-made events and yet she tells the tale with a heart free of revenge.

Worksheet 16

Nuclear War's Effect on the Mind

by Robert Jay Lifton and Kai Erickson

New Haven -- "Scenarios" about fighting, recovering from, or even "winning" a nuclear war tend to be remarkably vague about the psychological condition of survivors.

Some commentators simply assume that survivors will remain stoic and begin to rebuild from the ruins in a calm, disciplined way. Others seem to attribute that rebuilding to a mysterious, unseen hand. Usually absent is a reasoned estimate, on the basis of what experience we have, of how people might actually be expected to behave.

Recently, physicians and other scientists have been making careful projections of the effects of nuclear war, and all raise severe doubts about general claims of recovery.

A 20-megaton bomb, for instance, if detonated over New York City, Chicago or Leningrad, would vaporize, crush, incinerate, or burn to death almost every person within a radius of five or six miles from the center of the blast--two million people, perhaps. Within a radius of 20 miles, a million more or so would either die instantly or would suffer wounds from which they could not recover. If the bomb exploded on the ground, countless others who live miles away, far beyond the reach of the initial blast and searing heat wave, would be sentenced to a lingering death as radioactive fallout drifted quietly down into people, buildings, water and food supplies, and the earth itself.

But that picture, harsh as it seems, is inadequate even for a limited nuclear war and certainly for a full-scale one.

New York City, say, would be hit by many warheads, as would other cities, industrial centers, and military targets--hundreds of warheads, maybe thousands.

One has to try to imagine 100 million or more people dead, and lethal amounts of radioactivity scattered over huge areas.

And the survivors? Would they panic? Would they help one another? What would they feel and do?

In Hiroshima, survivors not only expected that they too would soon die, they had a sense that everyone was dying, that "the world is ending." Rather than panic, the scene was one of slow motion--of people moving gradually away from the center of the destruction, but dully and almost without purpose. They were, as one among them put it, "so broken and confused that they moved and behaved like automatons...a people who walked in the realm of dreams." Some tried to do something to help others, but most felt themselves to be so much part of a dead world that, as another remembered, they were "not really alive."

The key to that vague behavior was a closing off of the mind so that no more horror could enter it. People witnessed the most grotesque forms of death and dying all around them but felt nothing. A profound blandness and insensitivity--a "paralysis of the mind"--seemed to take hold in everyone. People saw what was happening and were able to describe it later in sharp detail, but their minds, they said, were numbed.

Hiroshima and Nagasaki, however, can provide us with no more than a hint of what would happen in the event of nuclear war.

A single weapon today can have the power of 1,000 Hiroshima bombs, and we have to be able to imagine 1,000 of those exploding in the space of a few minutes. Moreover, in the case of Hiroshima and Nagasaki--and this is absolutely crucial--there was still a functioning outside world to provide help.

In a nuclear war, the process of psychic numbing may well be so extreme as to become irreversible.

Imagine the familiar landscape turning suddenly into a sea of destruction: everywhere smoldering banks of debris; everywhere the sights and sounds and smells of death. Imagine that the other survivors are wandering about with festering wounds, broken limbs, and bodies so badly burned that their features appear to be melting and their flesh is peeling away in great raw folds. Imagine--on the generous assumption that your children are alive at all--that you have no way of knowing whether the radiation they have been exposed to has already doomed them.

The suddenness and the sheer ferocity of such a scene would not give survivors any chance to mobilize the usual forms of psychological defense. The normal human response to mass death and profound horror is not rage or depression or panic or mourning or even fear; it is a kind of mental anesthetization that interferes with both judgment and compassion for other people.

In even minor disasters, the mind becomes immobilized, if only for a moment. But in the event of a nuclear attack, the immobilization may reach the point where the psyche is no longer connected to its own past and is, for all practical purposes, severed from the social forms from which it drew strength and a sense of humanity. The mind would, then be shut down altogether.

The resulting scene might very well resemble what we usually can only imagine as science fiction. The landscape is almost moon-like, spare and quiet, and the survivors who root among the ruins seem to have lost contact with one another, not to mention the ability to form cooperating groups and to offer warmth and solace to people around them.

In every castrophe for which we have adequate records, survivors emerge from the debris with the feeling that they are (to use the anthropologist Anthony Wallace's words) "naked and alone...in a terrifying wilderness of ruins."

In most cases--and this, too, is well-recorded in the literature of disaster--that sense of isolation quickly disappears with the realization that the rest of the world is still intact. The disaster, it turns out, is local,

confined, bounded. Out there beyond the peripheries of the affected zone are other people--relatives, neighbors, countrymen--who bring blankets and warm coffee, medicines and ambulances. The larger human community is gathering its resources to attend to a wound on its flank, and survivors respond to the attention and the caring with the reassuring feeling that there is life beyond the ruins, after all. That sense of communion, that perception that the textures of social existence remain more or less whole, is a very important part of the healing that follows.

None of that will happen in nuclear war.

There will be no surrounding human community, no undamaged world out there to count on.

No one will come in to nurse the wounded or carry them off to hospitals. There will be no hospitals, no morphine, no antibiotics.

There will be no succor outside--no infusion of the vitality, the confidence in the continuity of life, that disaster victims have always needed so desperately.

Rather, survivors will remain in a deadened state, either alone or among others like themselves, largely without hope and vaguely aware that everyone and everything that once mattered to them has been destroyed.

Thus, survivors would be experiencing not only the most extreme forms of individual trauma imaginable but an equally severe form of collective trauma stemming from a rupture of the patterns of social existence.

Virtually no survivors will be able to enact that most fundamental of all human rituals, burying their own dead.

The bonds that link people in connecting groups will be badly torn, in most cases irreparably, and their behavior is likely to become muted and accompanied by suspiciousness and extremely primitive forms of thought and action.

Under these conditions, such simple tasks as acquiring food and maintaining shelter would remain formidable for weeks and months, even years. And the bands of survivors would be further reduced not only by starvation but also by continuing exposure to radiation and by virulent epidemics.

For those who manage to stay alive, the effects of radiation may interfere with their capacity to reproduce at all or their capacity to give birth to anything other than grossly deformed infants. But few indeed would have to face that prospect.

The question so often asked, "Would the survivors envy the dead?" may turn out to have a simple answer. No, they would be incapable of such feelings. They would not so much envy as, inwardly and outwardly, resemble the dead.

Reprinted with permission from The New York Times, Monday, March 14, 1982.

Worksheet 17

Letter Written by a Seven-Year-Old

A letter written by seven-year-old Sarah Kerlin in Albany:

"Dear Mr. Regan: I think that you should stop making any kind of bomb just because I am in 2nd grade does not mean I do not care because I do. In the world we have unuf bombs to blow up the world 10 TIMES! You miht think that I am just a stupid little girl but I am not. It is so discusting that there was going be a war whith us, I woild take a knife and kill my self.

"I am not the only one who cares. It is not funny at all! We want peace in our world! You might not no what happend in Japan in 1945, but I do and I and thousands of other people do not want it to happen agian any were I am going to tell my children about this. I am not being funny. I am not doing this because I head someone say that they did. There is a time to play and a time not to and I am not playing. I am

Sarah Kerlin and I want this to stop."

Worksheet 18

Dear Student

Dear Student,

When Dr. Helen Caldicott spoke at my high school last year on the dangers of nuclear war, I went home and paced the kitchen floor trying to figure out what I could do, instantly, to help bring about a change. Of course, change doesn't come about instantly, and all I could do that afternoon was to call several local anti-nuclear organizatons to discover whether they knew of any high school groups. But that was a start.

Although my ideas at that point were vague, I started to talk to other students who had the same reaction to Dr. Caldicott's presentation. From our discussions grew weekly meetings, a day-long, all-school teach-in, and a growing and active disarmament group at my high school.

I think we surprised ourselves with what we were able to accomplish; after all, we were just a bunch of kids--how could we tell teachers what was important for them to teach? But once we got used to taking the initiaive, we found that the teachers and administration of our high school were generally receptive to our plans. In fact, being a student group in some ways gave us more influence. Teachers were impressed that we felt strongly enough about disarmament to try to inform and involve others; even those who disagreed with us congratulated us on the success of the teach-in. Other students were less likely to view the issue as "another one of those boring things the teacher thinks we should know." Finally, while some teachers may feel uncomfortable taking a stand on a controversial issue, we did not have to worry about being objective.

On October 25, schools around the country will take part in a national Day of Dialogue about the nuclear arms race. If you are concerned about the issue, don't hesitate to involve yourself in planning activities for the day! Your teacher has received a packet of information and suggestions; you can use this as a first resource. You will need to find out what the teachers in your school are planning, but you don't need to limit yourself to their ideas; they will probably be glad to have your help or to see you do something on your own.

If you want to get in touch with other high school students, contact the Student/Teacher Organization to Prevent Nuclear War (STOP Nuclear War). They have chapters all over the country and are a useful resource for support and suggestions whether you want to start a chapter, lead a discussion, or just find out more about what high school students can do. They can be reached at:

STOP Nuclear War	Northfield, MA 01360
Box 232	(413) 498-5311, ext. 264

The dangers of nuclear war are so immense that they often seem overwhelming, but even the smallest efforts to eliminate them can be the beginning of a larger influence. I am convinced we can all make a difference.

Debora Tessman